The effects of early weaning calves

INTRODUCTION

Economic pressures to improve cow herd efficiency and productivity has prompted the beef cattle industry to investigate the efficiency and meat quality aspects when early weaning calves from their dams and/or creep feeding the calves prior to feedlot entry.

The effects of early weaning calves has been researched for many years in the dairy industry but is relatively new in the beef industry. Early weaning may serve as a management tool, particularly in poor nutrition years, where the calf's nutrition requirements are transferred from the dam's nursing ability to the feed quality supplied for the calf.

Creep feeding is another management tool being realized to compensate for poorly nursing dams, where declining milk production after two months of Lactation, Limits the calf's energy intake and growth (Robison et.al. 1978). Creep feeding may also e utilized as a preconditioning tool for feedlot calves, however it must be cautioned that feedlot calves do not become over fat during this period. Economically, creep feeding is questionable where it has been shown that non-creep fed calves show increased weight gains to compensate for earlier growth. For pre-conditioning purposes, limiting the amount of creep feed enables the calf to become pre-conditioned for the feedlot diet in an economical manner.

Carcass characteristics are the main reason why producers may alter current management practices, and Myers *et.al.* (b) (1999) supports early weaning by reporting that early weaning increases the percentage of steers grading average choice or better by 40%.

The objectives of this experiment were to evaluate the effects of weaning and/or creep feeding beef calves at 150 or 205 daysof age and the subsequent effects on meat quality of the carcasses.

MATERIALS AND METHODS:

<u>ANIMALS:</u>

96 Angus and Angus X Simmental calves, average age 122 days, were randomly assigned in a 2 X 2 factorial arrangement, into 4 treatment groups of; 1) Early weaned (150 days), creep fed, 2) Early weaned non creep fed, 3) Normal weaned (205 days), Creep fed, 4) Normal weaned non-creep fed. Those steers assigned the early weaned, creep fed treatment were separated with their dams and permitted the creep feed diet (appendix 2) for 28 days until the calves were of mean age 150 days. Steers in the early weaned, non-creep fed were released to suckle their dams until mean age 150 days, when all early weaned calves entered the feedlot.

Normal weaned treatment steers were released to suckle their dams until 177 days, when the creep fed treatment calves and dams were separated and allowed creep feed for 28 days, until all normal weaned calves entered the feedlot at mean age of 205 days.

All dams were body condition scored and weighed upon trial commencement. Cows were body condition scored again when the calves were removed to the feedlot. All heifer calves from the dams bred were returned to the herd as breeding replacements.

FEEDLOT TREATMENTS:

At 150 and 205 days of age, 24 steers for each treatment, entered the feedlot, where all treatments were grouped with 6 animals and housed in partly enclosed pens. Upon entry, liveweights were taken without removal from food or waer and Synovex C growth stimulant (100 mg of progesterone and 10mg of estradiol benzoate; Syntex, Palo Alto CA), inserted subcutaneously in each steer's ear and the health status closely inspected. Rectal temperature was taken if nasal discharge or unthriftiness was noted and antibiotics administered accordingly (Appendix 1). After treatment, calves returned to their original pens. Calves were weighed without removal from feed and water.every 14 days for 11 weeks, when weights were recorded every 28 days for the remaining 20 weeks until the trial's completion.

DIETS:

All steers were fed once daily on ad libitum intake, a diet formulated to supply 15% crude protein, 15.16% Undegraded Protein (as % of crude protein), and Net Energy (for growth) 0.63 Mcal/lb (Appendix 3). Feed intake was monitored daily, and refusals were removed from the bunk prior to the next feeding. Feed intake was monitored on a pen basis and recorded daily. DMI, ADG and efficiencies as feed:gain ratios were calculated upon trial completion.

HARVEST READINESS:

Ultrasound technologies (Alkoa 500V 3.5MHz with linear array probe; Wallingford, Coneticut) were used every 28 days for the last 12 weeks of the trial to determine 12th rib back fat depth, intramuscular fat deposition and loin eye muscle area of each steer. Ultrasound and weight data was analyzed and compared against criteria for the USDA Choice grade standards; Back fat depth of 10 mm, Intramuscular deposition indicating a marbling score of greater than 5, weight 1200- 1400 pounds and visual assessment, to determine the harvest time for each steer.

DATA ANALYSIS:

Feedlot Performance and carcass characteristics were analysed in a 2x2 factorial arrangement consisting of weaning age and creep feed regiment, using ANOVA. procedures in the GLM procedures of SAS (SAS Institute Inc. Cary, NC 2000), consisting of weaning age and creep feed regiment. Pen was used as the experimental unit for feedlot performance while steer was the experimental unit for carcass performance. The model included the main effects and interaction terms. Pen within treatment served as the error term for performance and animal within pen served as the error term for ultrasound and carcass data.

RESULTS AND DISCUSSION:

Body weight changes across treatments (figure 1) indicates an advantage in early weaning and creep feeding calves, when compared to the other treatments analysed. Creep feeding calves were heavier at feedlot entry and had a higher ADG, although these differences were not significant in altering the weight at feedlot entry ($P=0.96$) or ADG prior to feedlot entry ($P=0.45$).
Trends ($P=.11$) may be deduced from the ADG immediately following feedlot entry, however the overall ADG ($P=0.98$) concludes that creep feeding calves for accelerated ADG or heavier weights at feedlot entry is not a significant advantage.

These results are also confirmed with the regular weaned, creep fed calves. The creep fed groups were 1.06 kilograms heavier ($P=0.90$) at feedlot entry, but showed a lower ADG prior to feedlot entry ($P=0.88$).

The effect of creep feeding and the time of feedlot entry does not show any significantly different results, with the creep feeding/weaning interaction ($P=0.41$) showing the most notable trends for ADG prior to, and immediately following feedlot entry, where the early weaned, creep fed calves displayed a higher ADG for this period.

Age at harvest averaged 352.25 days and showed significant effects for the weaning groups. Early weaned groups were 8.5 days younger at harvest ($P=0.0002$) although creep feeding or the creep feeding/weaning group did not show any significant impact ($P=0.66$) on the days to harvest. Time in the feedlot averaged 178.25 days and weaning also had a significant effect ($P<0.0001$) on the time spent in the feedlot, where the early weaned calves spent 36.5 days longer in the feedlot. The effect of creep feeding or the creep feeding/weaning interaction again showed no significant differences ($P=0.66$ for both instances) for the age at harvest. Where the early weaned, creep fed calves were fed 28 days more than the non creep fed calves. This could imply disadvantage of creep feeding for economical gain for the beef producer, where the extra time spent on creep feed did not decrease the age at harvest for these animals.

Dry matter intake, averaging 14.46 pounds (6.57 kilograms) for the 1st 28 days, on a pen basis also shows that early weaned calves ate more to gain their higher ADG values as shown above. The early weaned calves consumed the most feed ($P<.0001$), while creep feeding did not have an effect on the amount of feed consumed.

Analysis of Average Daily Gains (ADG's) by weigh period (figure 3) indicates a period of acidosis experienced by all treatments during the 4th and 5th months of the trial. Incorrect feeding management and subsequently overeating of concentrated feed caused sloughing of the rumen microbes and decreased feed intake during this period. At the end of this period, feeding amounts were revised and ADG and weight gains recommenced. ADG's over the whole period shows a significant difference for weaning management of the calves. Early weaned calves demonstrated an overall ADG of 1.709kilograms per day as compared to 1.541 kilograms per day for the regular weaned calves ($P<0.0001$). ADG's were also significantly higher for the early weaned groups throughout the trial with P values <0.0001, 0.019, 0.71, 0.48.

Creep feeding result did not show the same differences with creep fed calves displaying an overall ADG of 1.617 kilograms per day as compared to 1.633 kilograms per day for the non creep fed calves ($P = 0.6201$). In contrast to this trial's results, Myers *et.al.* (c) (1999) indicates that any decrease in age at slaughter for early-weaned calves compared to normal weaned calves comes from the additional weight gain that early-weaned calves have during the period between early and normal weaning times. Harvey and Burns (1988) confirms this by suggesting that early-weaned calves were very efficient in their use of concentrate feed for gain.

Carcass data shows significant trends and differences, with the early weaned groups grading a higher number of choice grade carcasses, with more marbling. The effect of weaning ($P=0.02$) shows that the early weaned calves grade 0.34 points higher, although creep feeding showed no differences for producing a higher marbled carcass ($P=0.90$). In relation to this, early weaning also produced carcasses with 0.044 inches (0.11 cm) more backfat ($P=0.09$). Creep feeding, nor creep feeding/weaning interactions had any significant effect on backfat levels ($P=0.46$ and 0.45 respectively). Early weaning calves also produced a heavier carcass, at 737.02 pounds (335.00 kilograms), although not significantly different ($P=0.46$) to the normal weaned carcasses. Interestingly, creep feeding had the greatest impact on the rib eye area, this trial's muscling indicator, where the creep fed calves showed the largest rib eye area at 12.24 in^2 (76.5m2) ($P=0.30$). Weaning effects and creep feeding/weaning interactions did not show any significant results at $P=0.41$ for both aspects. Creep feeding/weaning interactions showed the strongest trends ($P=0.11$) for the amount of Kidney, Pelvic and Heart fat (KPH fat) deposited by the calves. The early weaned, creep fed calves laid down the greatest amounts of KPH fat. Creep feeding also showed stronger trends ($P=0.17$) for the deposition of KPH fat, where creep fed calves laid down greater amounts. The final US Yield Grade for these calves do not show any differences although the weaning schedule showed trends at $P=0.38$, where the early weaned calves graded more favourably at 2.83 as compared to 2.90 for normally weaned calves. The USDA quality grade showed trends for creep feeding calves ($P=0.43$)where the non-creep fed calves graded higher at 2.62 Duckett et.al. (1993) reported that intramuscular fat deposition seemed to be a function of the number of days that the cattle are exposed to highly concentrated diets. This report also observed that approximately 112 days, on a high concentrate diet was needed for British cross steers to reach choice quality grading.

Weaning consistently shows to have a significant effect on the weights throughout the trial's progression. Weights at 91 days after the trial's commencement, shows that the early weaned calves were significantly heavier (P=0.0014) at 704.0 pounds (320 kilograms). These trends continued with the early-weaned groups showing significantly heavier weights (P=0.0019, 0.0004, 0.0017, 0.009) until the trial's completion.
Creep feeding did not show the same significant results however, with trends being deduced from many results but no conclusive evidence for the advantages of creep feeding with the final weight showing a P value of 0.98 and the overall P value for ADG being 0.62.

Ultrasound data reinforces the significance of growth rate and subsequent speed to market readiness of early-weaned calves and creep fed calves. A majority of the 42 calves harvested on March 6th 2001, were from the early-weaned groups. This is in accordance with Duckett *et.al.* (1993) who reports that intramuscular fat deposition seemed to be a function of the number of days that the cattle were exposed to a high concentrate diet on feed. This could indicate that a system that combines creep feeding a concentrate, to calves that are placed in the feedlot at an earlier age (i.e. early weaning) may have marbling advantages. Lunt and Orme (1987) discusses that to obtain the same carcass composition, cattle that are fed an energy dense diet soon after weaning would need to be harvested at a higher weight than cattle that are fed on forage for a period of time prior to finishing. Both of these studies indicate to the producer that economic gains may be achieved through creep feeding and/or early weaning, either through feeding cattle for a longer period to achieve a higher grade, or harvesting the cattle at a younger age. Fluharty *et.al.* (1999) also confirms this when explaining that early-weaned steers fed a high concentrate diet are very efficient in conversion of feed to gain early in the finishing period. Early weaning may be a beneficial alternative in years when pasture is limited and may be a quicker way to direct young calves to a higher quality grade over traditional means.

Harvey *et.al.* (1988) discusses that generally, gains of early-weaned calves were similar or greater than gains of early-weaned calves. This could be due to the young calves having the ability to utilize high quality feed to promote gain.
Neville and McCormick (1981) concluded from their trial that beef calves can be weaned as early as 67 days of age and fed on pasture or in a feedlot with no adverse health problems. The early-weaned calves can gain faster and have heavier weights at normal weaning time. This accelerated growth is usually carried through the feedlot stage, having higher 205-day weights. In contrast to results found in this trial, Fluharty *et.al.* (1999) found that 78% of the early-weaned steers graded low choice or better, compared with 94% of the normal weaned steers.

	Early weaned, creep fed	Early weaned, non-creep fed	Normal weaned, creep fed	Normal weaned, non-creep fed	SEM
No. of Steers	24	21	23	24//	
Initial Weight	418.41	421.04	424.17	420.08	13.69
Harvest Weight	1193.8	1194.12	1166.67	1166.99	14.54
Days on creep feed	28	0	28	0//	
Days in feedlot	187.58	187.58	169.92	169.92	1.35
ADG (pounds)					
Prior to Feedlot Entry	3.08	3.08	2.5	2.52	0.097
After Feedlot Entry	3.66	3.68	3.48	3.49	0.048
Overall	3.89	4.02	3.60	3.54	0.055
Dry Matter Intake	25.32	25.48	19.56	19.26	0.342
Feed Efficiency (feed:gain)	0.15	0.16	0.19	0.18	0.003
Carcass Weight (pounds)	738.33	733.81	724.35	725.42	9.88
Backfat Depth (inches)	0.42	0.46	0.41	0.40	0.018
Marbling Score	5.02	4.87	4.83	4.92	0.107
Rib Eye Area (inches2)	12.21	12.16	10.25	11.98	0.177
KPH fat	2.08	2.02	2.02	2.00	0.046
Yield Grade	2.90	2.97	2.70	2.83	0.071
Quality Grade	2.54	2.33	2.48	2.58	0.092

SEM= Greatest Standard of Error of treatment means reported.

Table 1. Effect of early weaning and creep feeding calves on meat quality characteristics.

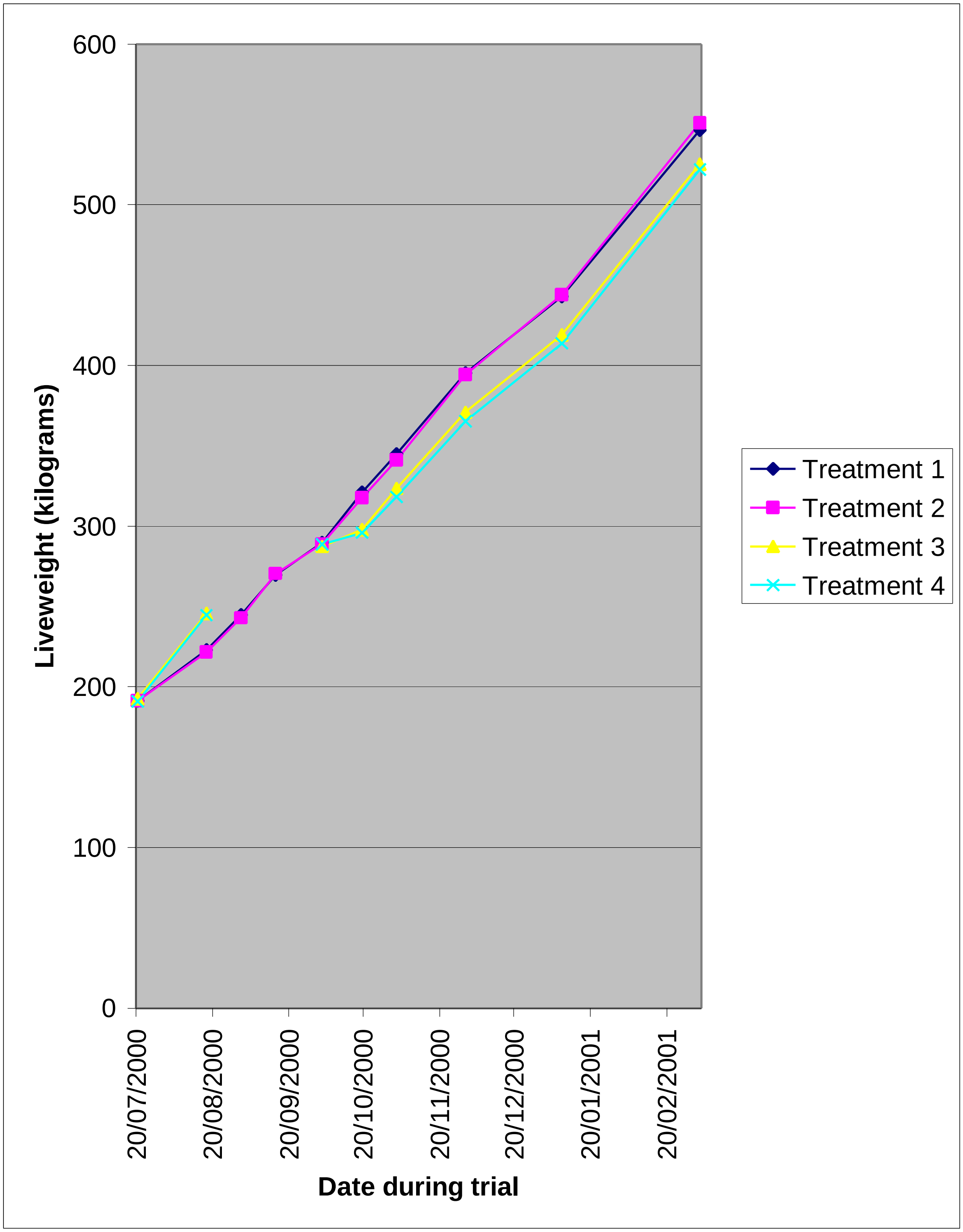

Figure 1. Calf body weight during trial period.

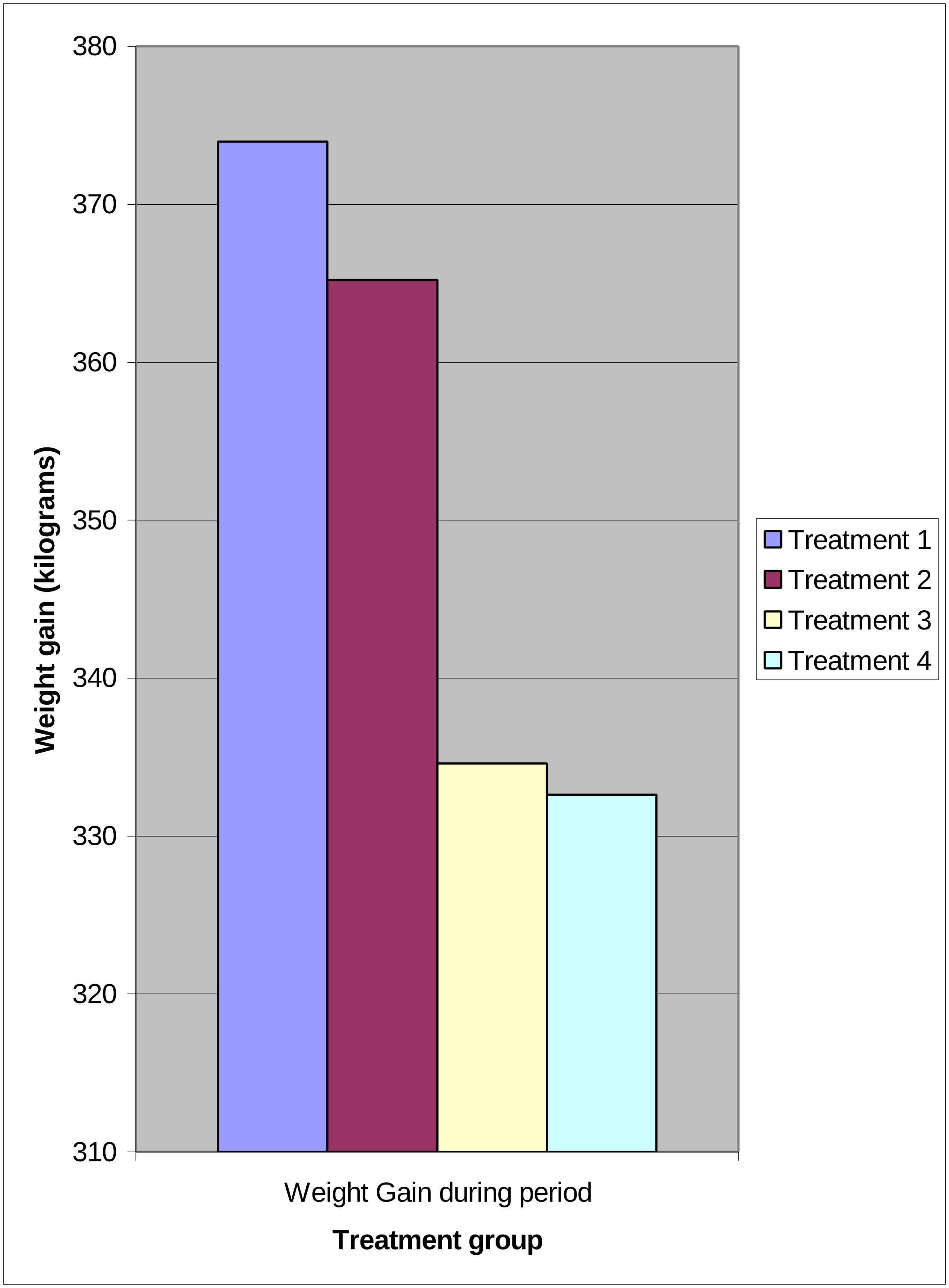

Figure 2. Total weight gain during trial period for each treatment.

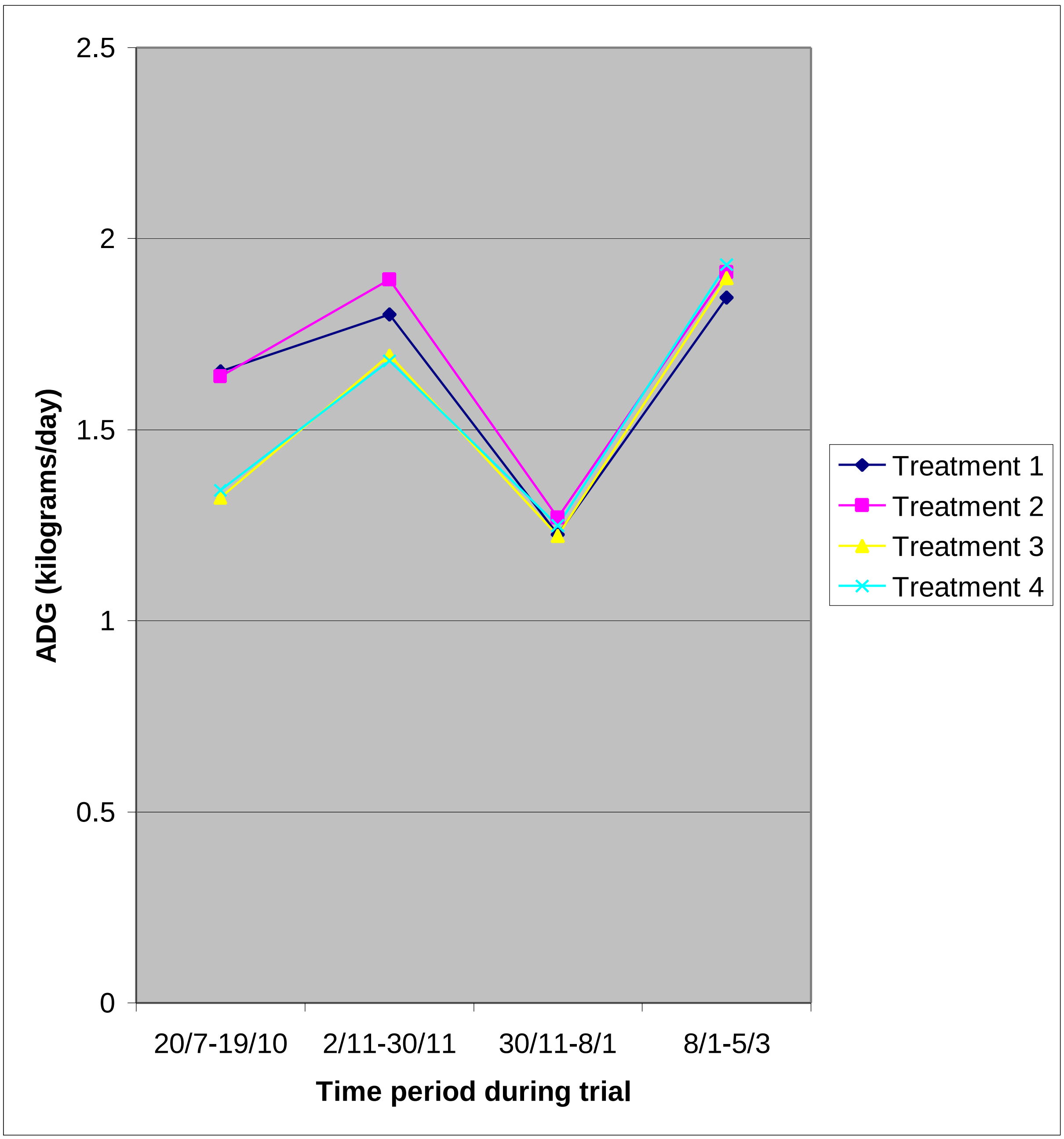

Figure 3. Average daily gain during trial for each treatment.

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Appendix 1: Health records for all steers treated during trial

Date	Animal ID	Diagnosis	Medication 1	Dosage	Units	Pen #	Temp.	Comments
8/25/00	K350	Respiratory	Nuflor	23	ml	MB 13	104.7	retemp from 8-24
8/25/00	K361	Respiratory	Micotil	9	ml	MB 13	104.4	
8/25/00	K418	Respiratory	Nuflor	33	ml	MB 5	105.1	
8/28/00	K361					MB 13		scours/but doing ok wt.
8/29/00	K153	Respiratory	Micotil	7.5	ml	MB 5	105.6	Watch - recheck temp
8/29/00	K314	Respiratory	Micotil	6	ml	MB 13	103.3	
8/29/00	K361	Respiratory	Nuflor	30	ml	MB 13	103.5	
8/29/00	K362	Temperature				MB 9	102.4	
8/29/00	K417	Respiratory	Micotil	7.5	ml	MB 6	103.6	
8/29/00	K467	Respiratory	Micotil	9	ml	MB 9	102.9	
8/30/00	K108	Respiratory	Micotil	9	ml	MB 5	104.7	
8/30/00	K153	Re-temp				MB 5	104.3	temp went down
8/30/00	K306	Respiratory	Micotil	7.5	ml	MB 2	102.7	
8/30/00	K330	Respiratory	Micotil	7.5	ml	MB 2	103.1	
8/30/00	K357	Temperature				MB 2		
8/30/00	K360	Temperature				MB 9	102.8	Hit gate latch, sore on leg
8/30/00	K432	Respiratory	Micotil	10	ml	MB 6	104.3	
8/31/00	K101	Respiratory	Micotil	7	ml	MB 10	105.2	
8/31/00	K106	Respiratory	Micotil	7	ml	MB 10	103.8	
8/31/00	K339	Respiratory	Nuflor	19	ml	MB 10	103.1	
9/1/00	K186	Died				MB 10		
9/5/00	K360	check for progress				MB 9		Walking better on FL shoulder
9/6/00	K101	Foot Rot	LA 200	22	ml	MB 10	102.5	
9/14/00	K111	Respiratory	Micotil	8	ml	MB 6	102.9	
9/14/00	K153	Respiratory	Micotil	8	ml	MB 5	103.7	
9/14/00	K176	Respiratory	Micotil	9	ml	MB 6	104.0	
9/14/00	K346	Respiratory	Micotil	7	ml	MB 6	103.8	
9/19/00	K311	Respiratory	Micotil	10	ml	MB 14	106.1	re-temp 9-20 103
9/19/00	K335	Respiratory	Micotil	11.5	ml	MB 13	104.6	retemp 9-20 104.4
9/19/00	K361	Respiratory	Micotil	10	ml	MB 13	106.1	re-temp 9-20 104.5
9/19/00	K370	Respiratory	Micotil	10	ml	MB 14	103.7	re-temp 9-20 104.4
9/19/00	K384	Respiratory	Micotil	8	ml	MB 13	105.6	re-temp 9-20 104.3
9/19/00	K408	Respiratory	Micotil	10	ml	MB 14	104.0	re-temp 9-20 104.5
9/19/00	K416	Respiratory	Micotil	11	ml	MB 14	104.6	re-temp 9-20 104.3
9/20/00	K 432	Respiratory	Micotil	11	ml	MB 6	103.4	
9/20/00	K101	Respiratory	Micotil	8	ml	MB 10	103.6	
9/20/00	K106	Respiratory	Micotil	9	ml	MB 9	104.3	
9/20/00	K108	Respiratory	Micotil	11.5	ml	MB 5	105.6	
9/20/00	K111	Respiratory	Micotil	10	ml	MB 6	104.0	
9/20/00	K153	Respiratory	Micotil	8.5	ml	MB 5	105.7	
9/20/00	K176	Respiratory	Micotil	9	ml	MB 6	103.6	
9/20/00	K180	Respiratory	Micotil	8	ml	MB 6	104.5	
9/20/00	K195	Respiratory	Micotil	11	ml	MB 1		
9/20/00	K216	Respiratory	Micotil	8.5	ml	MB 1		
9/20/00	K300	Temperature				MB 10	102.4	
9/20/00	K306	Respiratory	Micotil	9	ml	MB 2		

9/20/00	K312	Respiratory	Micotil	10	ml	MB 5	104.1	
9/20/00	K314	Temperature				MB 13	102.2	
9/20/00	K315	Respiratory	Micotil	9.5	ml	MB 14	104.5	
9/20/00	K330	Respiratory	Micotil	8.6	ml	MB 2		
9/20/00	K339	Respiratory	Micotil	8	ml	MB 10	104.4	
9/20/00	K342	Respiratory	Micotil	9.5	ml	MB 2		
9/20/00	K346	Respiratory	Micotil	7.5	ml	MB 6	104.2	
9/20/00	K348	Respiratory	Micotil	9	ml	MB 9	104.1	
9/20/00	K350	Respiratory	Micotil	7	ml	MB 13	104.5	
9/20/00	K356	Respiratory	Micotil	8.5	ml	MB 1		
9/20/00	K357	Respiratory	Micotil	9.5	ml	MB 2		
9/20/00	K360	Respiratory	Micotil	11	ml	MB 9	103.6	Watch eye
9/20/00	K362	Respiratory	Micotil	9	ml	MB 9	105.9	
9/20/00	K363	Respiratory	Micotil	10.5	ml	MB 9	105.0	
9/20/00	K372	Respiratory	Micotil	8.5	ml	MB 1		
9/20/00	K376	Respiratory	Micotil	9	ml	MB 13	103.7	
9/20/00	K398	Respiratory	Micotil	10	ml	MB 10	104.5	
9/20/00	K411	Respiratory	Micotil	10	ml	MB 14	103.9	
9/20/00	K412	Respiratory	Micotil	11	ml	MB 5	105.6	
9/20/00	K417	Respiratory	Micotil	8.5	ml	MB 6	103.3	
9/20/00	K418	Respiratory	Micotil	9.5	ml	MB 5	106.0	
9/20/00	K448	Respiratory	Micotil	9.5	ml	MB 2		
9/20/00	K450	Respiratory	Micotil	8	ml	MB 1		
9/20/00	K463	Respiratory	Micotil	11	ml	MB 10	103.6	
9/20/00	K465*1	Respiratory	Micotil	10	ml	MB 5	103.5	
9/20/00	K467	Respiratory	Micotil	9	ml	MB 9	104.2	
9/20/00	K470	Respiratory	Micotil	9	ml	MB 1		
9/22/00	K372	Lethargic	None			MB 1		
12/24/00		Bleeding, left ear tag	None					Removed ear tag
12/26/00	K180	Respiratory	Micotil	12	ml	MB 6	105.7	
12/26/00	K335	Respiratory	Micotil	17	ml	MB 13	105.4	
12/26/00	K354	Respiratory	Micotil	11	ml	MB 8	105.6	
12/26/00	K376	Respiratory	Micotil	14	ml	MB 13	106.0	
12/26/00	K407	Respiratory	Micotil	15	ml	MB 15	104.4	
12/26/00	K411	Respiratory	Micotil	16	ml	MB 14	106.0	
12/26/00	K417	Respiratory	Micotil	15	ml	MB 6	105.5	
12/26/00	K423	Respiratory	Micotil	16	ml	MB 15	105.1	
12/26/00	K447	Respiratory	Micotil	12	ml	MB 16	104.8	
12/26/00	K458	Respiratory	Micotil	14	ml	MB 15	105.7	
12/27/00	K	Respiratory	Micotil	12	ml	MB 16	104.8	
12/27/00	K102	Respiratory	Micotil	13	ml	MB 16	104.6	
12/27/00	K106	Respiratory	Micotil	14	ml	MB 9	104.7	
12/27/00	K137	Respiratory	Micotil	12	ml	MB 4	104.7	
12/27/00	K151*1	Respiratory	Micotil	13	ml	MB 3	104.7	
12/27/00	K189	Respiratory	Micotil	15	ml	MB 12	103.7	
12/27/00	K312	Respiratory	Micotil	15	ml	MB 5	104.8	
12/27/00	K314	Respiratory	Micotil	12.5	ml	MB 13	103.8	
12/27/00	K315	Respiratory	Micotil	14	ml	MB 14	104.5	
12/27/00	K337	Respiratory	Micotil	12	ml	MB 11	102.7	
12/27/00	K348	Respiratory	Micotil	13	ml	MB 9	105.1	

12/27/00	K350	Respiratory	Micotil	13	ml	MB 13	104.1	
12/27/00	K362	Respiratory	Micotil	14	ml	MB 9		
12/27/00	K372	Respiratory	Micotil	13	ml	MB 1	101.8	
12/27/00	K384	Respiratory	Micotil	14	ml	MB 13	104.3	Bloated also
12/27/00	K387	Respiratory	Micotil	15	ml	MB 7	103.9	
12/27/00	K394	Respiratory	Micotil	15	ml	MB 4	104.7	
12/27/00	K395	Respiratory	Micotil	15	ml	MB 4	105.4	
12/27/00	K408	Respiratory	Micotil	13.5	ml	MB 14	105.5	
12/27/00	K417	Re-check	None			MB 6	104.2	
12/27/00	K432	Respiratory	Micotil	16	ml	MB 17	104.1	
12/27/00	K435	Respiratory	Micotil	14	ml	MB 12	104.9	
12/27/00	K438	Respiratory	Nuflor	60	ml	MB 4	103.2	
12/27/00	K439	Respiratory	Micotil	14.5	ml	MB 4	104.1	
12/27/00	K448	Respiratory	Micotil	15	ml	MB 2	104.2	
12/27/00	K449	Respiratory	None			MB 11	103.6	
12/27/00	K451	Respiratory	Nuflor	58	ml	MB 3	103.7	
12/27/00	K465*1	Respiratory	Micotil	15	ml	MB 5	106.4	
12/27/00	K466	Respiratory	None			MB 11	103.0	
12/28/00	K110	Respiratory	Micotil	14.5	ml	MB 12	104.8	
12/28/00	K134	Respiratory	Micotil	11.5	ml	MB 8	104.5	
12/28/00	K339	Respiratory	Micotil	12	ml	MB 10	104.3	
12/28/00	K348	Pulled	None			MB 9	103.6	
12/28/00	K418	Respiratory	Micotil	15	ml	MB 5	106.1	
12/28/00	K439	Re-check	None			MB 4	103.1	
12/28/00	K449	Pulled	None			MB 11	103.1	
12/28/00	K453	Respiratory	Micotil	14.5	ml	MB 8	104.0	
12/28/00	K460	Respiratory	Micotil	14.5	ml	MB 12	104.5	
12/28/00	K463	Respiratory	Micotil	15.2	ml	MB 10	104.0	
12/28/00	K466	Re-check	None			MB 11	103.2	
12/28/00	K467	Re-check	None			MB 9	103.0	
1/1/01	K312	Didn't come to bunk	None			MB 5		Check on 1/2/01
1/1/01	K314	Didn't come to bunk	None			MB 13		Check on 1/2/01
1/1/01	K312	Re-check	None			MB 5		Looked ok
1/1/01	K314	Re-check	None			MB 13		Looked ok
1/3/01	K372	Bloat	None			MB 1		Let air off
1/5/01	K357	Respiratory	Micotil	15.5	ml	MB 2	104.3	
1/5/01	K439	Pulled	None			MB 4	102.5	
1/5/01	K197	Respiratory	Micotil	10	ml	MB 7	103.8	
1/5/01	K398	Respiratory	Micotil	16	ml	MB 10	103.6	
1/12/01	K337	Limping	None			MB 10		
1/19/01	K361	Respiratory	Micotil	11.5	ml	MB 13		

Appendix 2:Creep feed diet prior to feedlot entry

Ingredient	Pounds per ton
Cracked Corn	910.4
Oats	500
Soybean Meal (47.5%)	400
Molasses	100
Dicalcium Phosphate	23
Soybean Oil	20
Forti Flex	20
White Salt	13
Super Micro	10
Selenium 270(mg/lb)	1.10
Feed Curb	1
Lasolicid Sodium (68g/lb)	1.5
Total:	2000 lbs

Appendix 3: Feedlot diet for all steers upon feedlot entry.

Ingredient	Pounds dry matter	Pounds as fed	Parts as fed basis
Soybean Meal 49%DM (44% as fed)	2.0264	2.2768	0.9132868
Limestone	0.17829	0.17829	0.071517
Salt	0.02667	0.02667	0.010698
Rumensin 80 300 mg/hd/day	0.00386	0.0039793	0.0015962
Tylan 40 75 mg/hd/day	0.00186	0.0019173	0.000769
Mn Sulfat 28.5%	0.00040	0.00040	0.0001604
Selenium 270	0.00148	0.00148	0.0005936
Zinc Sulfate 36%	0.00065	0.00065	0.0002607
Vitamin A 30000IU/gm	0.000978	0.000978	0.0003923
Vitamin D3 16million IU/pound	0.000104	0.000104	0.0000417
Vitamin E 125000IU/pound	0.00149	0.00149	0.0005976
Cu Sulfate 25.2%	0.00014	0.00014	0.0000561
Iodine 50g	0.000075	0.000075	0.00003
TOTALS		2.4929736	0.9999994

Ingredient	% of diet (Dry Matter)
Corn Silage	15.00
Dry Rolled Corn	68.27
Supplement	16.81